

CLAIMS

1. A process for the preparation of a poly( $\alpha$ -methylstyrene) polymer by anionic polymerization of the  $\alpha$ -methylstyrene monomer, said process successively comprising the following stages:
  - a) a stage of preparation of a solution comprising the  $\alpha$ -methylstyrene monomer and a nonpolar aprotic solvent;
  - b) a stage of neutralization of the solution prepared in a) comprising the addition, to this solution, of an effective amount of at least one monofunctional organometallic initiator, so as to neutralize the proton sources of the solution prepared in a);
  - c) a stage of cooling the solution obtained in b) to a temperature of less than 0°C;
  - d) a stage of initiation of the polymerization comprising the addition, to the cooled solution obtained in c), of a predetermined amount of said monofunctional organometallic initiator;
  - e) a stage of propagation of the polymerization comprising the addition, to the solution obtained in d), of a polar aprotic solvent, said polar aprotic solvent being added in an amount which is lower than that of the nonpolar aprotic solvent;
  - f) a stage of termination comprising the addition, to the solution obtained in e), of a polar protic solvent.
2. The process as claimed in claim 1, in which the nonpolar aprotic solvent is chosen from the group consisting of aromatic hydrocarbons comprising from 6 to 10 carbon

atoms and aliphatic hydrocarbons.

3. The process as claimed in claim 1, in which the nonpolar aprotic solvent is toluene.
4. The process as claimed in claim 1, in which the monofunctional organometallic initiator is an organolithium compound.
5. The process as claimed in claim 4, in which the organolithium compound is chosen from the group consisting of n-butyllithium, sec-butyllithium and tert-butyllithium.
6. The process as claimed in claim 1, in which the neutralization stage b) is monitored using a UV cell.
7. The process as claimed in claim 1, in which the preparation stage a) and the neutralization stage b) are carried out at ambient temperature.
8. The process as claimed in claim 1, in which the cooling stage consists in cooling the solution obtained in b) to a temperature ranging from -50 to -10°C, preferably ranging from -50 to -25°C.
9. The process as claimed in claim 1, in which the polar aprotic solvent is chosen from the group consisting of tetrahydrofuran and tetrahydropyran.
10. The process as claimed in claim 1, in which the polar aprotic solvent is tetrahydrofuran.
11. The process as claimed in claim 1, in which the preparation stage a), the neutralization stage b), the

initiation stage d) and the propagation stage e) are carried out under an inert gas atmosphere.

12. The process as claimed in claim 1, additionally comprising, after the termination stage f), a stage of isolation of the poly( $\alpha$ -methylstyrene).
13. The process as claimed in claim 12, in which the stage of isolation of the poly( $\alpha$ -methylstyrene) is carried out by running the reaction mixture resulting from stage f) into methanol, followed by filtering off and drying the poly( $\alpha$ -methylstyrene) obtained.